UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Pertama
Sidang Akademik 2002/2003

September 2002

IUK 106 - Statistik Untuk Teknologis

Masa : 3 jam

Sila pastikan bahawa kertas peperiksaan ini mengandungi LAPAN mukasurat (termasuk tiga keping Lampiran) yang bercetak sebelum anda memulakan peperiksaan ini.

Jawab EMPAT (4) soalan. Semua soalan boleh dijawab samada dalam Bahasa Malaysia atau Bahasa Inggeris.

1. (a) Data berikut menunjukkan skor (dalam perkataan per minit) bagi 25 jurutaip yang menjalani ujian kelajuan menaip.

The following data represent the score (in words per minute) of 25 typists on a speed test.

Had kelas *Class limits*	Frekuensi *Frequency*
54-58	2
59-63	5
64-68	8
69-73	1
74-78	4
79-83	5

Hitungkan *Find:*

1- the mean *min*
2- sisihan piawai *standard deviation*
3- bina satu histogram *construct a histogram*
4- median *median*

(60 markah)

(b) Hitung skor Z bagi setiap ujian dan nyatakan yang manakah lebih tinggi.

Find Z score for each test and state which is higher.

Ujian A *Test A* $X = 94$ $\overline{X} = 100$ $S = 10$
Ujian B *Test B* $X = 38$ $\overline{X} = 40$ $S = 5$

(40 markah)

2. (a) Satu bekas mengandungi 4 bola biru, 3 bola merah, dan lima bola putih. Satu bola dipilih dan warnanya dikenalpasti. Kemudian bola dimasukkan semula dalam bekas. Bola yang kedua dipilih dan warnanya dikenalpasti. Apakah kebarangkalian bagi setiap yang berikut:

An urn contains four blue balls, three red balls, and five white balls. A ball is selected and its color noted. Then it is replaced. A second is selected and its color noted. Find the probability of each of the following:

1- Memilih 2 bola biru
Selecting two blue balls

2- Memilih bola merah diikuti dengan bola biru.
Selecting a red ball and then a blue ball.

(40 markah)

(b) Jika 20% daripada orang ramai dalam satu komuniti menggunakan bilik kecemasan di satu hospital dalam 1 tahun, dapatkan kebarangkalian berikut bagi sampel yang mengandungi 10 orang.

If 20% of the people in a community use the emergency room at a hospital in one year, find these probabilities for a sample of 10 people.

1- Paling tinggi 3 orang menggunakan bilik kecemasan
At most three used the emergency room

2- 3 orang tepat yang menggunakan bilik kecemasan
Exactly three used the emergency room

(60 markah)

3. (a) Seorang penyelidik perubatan ingin mengetahui samada denyutan nadi perokok lebih tinggi daripada denyutan nadi bukan perokok. Sampel yang terdiri daripada 100 perokok dan 100 bukan perokok dipilih. Keputusannya diberi di bawah.

A medical researcher wishes to see whether the pulse of smokers are higher than the pulse of nonsmokers. Samples of 100 smokers and 100 nonsmokers are selected. The results are shown below.

Bolehkah penyelidik tersebut membuat kesimpulan pada $\alpha = .05$ bahawa perokok mempunyai denyutan nadi yang lebih tinggi daripada bukan perokok?
Can the researcher conclude, at $\alpha = .05$ *the smokers have higher pulse rate than nonsmokers?*

Perokok *Smokers*	Bukan Perokok *Nonsmokers*
$\bar{X} = 90$	$\bar{X} = 88$
$S = 5$	$S = 6$
$n_1 = 100$	$n_2 = 100$

(60 markah)

(b) Seorang agen hartanah menyatakan bahawa purata sewa bagi pangsapuri studio di Shadyside ialah \$750. Sampel 12 orang penyewa mendapati bahawa min ialah \$732 dan sisihan piawai \$17. Adakah terdapat bukti yang cukup untuk menolak dakwaan agen hartanah tersebut. Guna $\alpha = .01$.

A rental agent states that the average rent for a studio apartment in Shadyside is \$750 A sample of 12 renters shows that the mean is \$732 and the standard deviation is \$17. Is there enough evidence to reject the agent's claim? Use $\alpha = .01$

(40 markah)

4. (a) Bagi data yang berikut

For the following data

X:	28	26	32	38	52	52
Y:	10	5	2	3	1.5	1

1- Hitung nilai bagi pekali korelasi.
Compute the value of the correlation coefficient.

2- Dapatkan persamaan garisan regresi, dan lukiskan garisan pada gambarajah serak.
Find the equation of the regression line, and graph the line on the scatter plot.

3- Dapatkan pekali penentuan.
Find the coefficient of determination.

(60 markah)

(b) Enam sampel yang terdiri daripada masa yang diambil oleh 5 pekerja untuk menyiapkan satu tugasan telah dipilih min dan julat bagi sampel tersebut ditunjukkan di bawah. Bina carta $\overline{X}$ dan carta R bagi data berikut.

Six samples consisting of the times (in minutes) it takes five employees to complete a task are selected. The means and ranges for the samples are shown below. Construct an $\overline{X}$ chart and an R chart for the data.

Sampel *Sample*	1	2	3	4	5	6
Min *Mean*	46.2	51	49.6	50.4	47.8	50.6
R	2	4	3	3	5	3

(40 markah)

Table E The Standard Normal Distribution

z	*.00*	*.01*	*.02*	*.03*	*.04*	*.05*	*.06*	*.07*	*.08*	*.09*
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.0288	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Source: Frederick Mosteller and Robert E. K. Rourke, *Sturdy Statistics*, Table A–1 (Reading, Mass.: Addison-Wesley, 1973). Reprinted with permission of the copyright owners.

Note: Use 0.4999 for *z* values above 3.09.

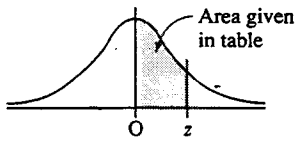

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Table 0 Factors for Computing Control Limits

Number of observations in sample, n	$\bar{X}$ chart: Factors for control limits A_2	R chart: Factors for control limits D_3	R chart: Factors for control limits D_4
2	1.880	0	3.267
3	1.023	0	2.575
4	0.729	0	2.282
5	0.577	0	2.115
6	0.483	0	2.004
7	0.419	0.076	1.924
8	0.373	0.136	1.864
9	0.337	0.184	1.816
10	0.308	0.223	1.777
11	0.285	0.256	1.744
12	0.266	0.284	1.716
13	0.249	0.308	1.692
14	0.235	0.329	1.671
15	0.223	0.348	1.652
16	0.212	0.364	1.636
17	0.203	0.379	1.621
18	0.194	0.392	1.608
19	0.187	0.404	1.596
20	0.180	0.414	1.586
21	0.173	0.425	1.575
22	0.167	0.434	1.566
23	0.162	0.443	1.557
24	0.157	0.452	1.548
25	0.153	0.459	1.541

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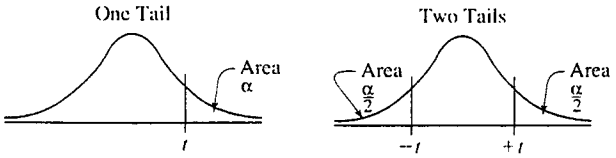
Table F The *t* Distribution

d.f.	Confidence intervals	50%	80%	90%	95%	98%	99%
	One tail, α	0.25	0.10	0.05	0.025	0.01	0.005
	Two tails, α	0.50	0.20	0.10	0.05	0.02	0.01
1		1.000	3.078	6.314	12.706	31.821	63.657
2		.816	1.886	2.920	4.303	6.965	9.925
3		.765	1.638	2.353	3.182	4.541	5.841
4		.741	1.533	2.132	2.776	3.747	4.604
5		.727	1.476	2.015	2.571	3.365	4.032
6		.718	1.440	1.943	2.447	3.143	3.707
7		.711	1.415	1.895	2.365	2.998	3.499
8		.706	1.397	1.860	2.306	2.896	3.355
9		.703	1.383	1.833	2.262	2.821	3.250
10		.700	1.372	1.812	2.228	2.764	3.169
11		.697	1.363	1.796	2.201	2.718	3.106
12		.695	1.356	1.782	2.179	2.681	3.055
13		.694	1.350	1.771	2.160	2.650	3.012
14		.692	1.345	1.761	2.145	2.624	2.977
15		.691	1.341	1.753	2.131	2.602	2.947
16		.690	1.337	1.746	2.120	2.583	2.921
17		.689	1.333	1.740	2.110	2.567	2.898
18		.688	1.330	1.734	2.101	2.552	2.878
19		.688	1.328	1.729	2.093	2.539	2.861
20		.687	1.325	1.725	2.086	2.528	2.845
21		.686	1.323	1.721	2.080	2.518	2.831
22		.686	1.321	1.717	2.074	2.508	2.819
23		.685	1.319	1.714	2.069	2.500	2.807
24		.685	1.318	1.711	2.064	2.492	2.797
25		.684	1.316	1.708	2.060	2.485	2.787
26		.684	1.315	1.706	2.056	2.479	2.779
27		.684	1.314	1.703	2.052	2.473	2.771
28		.683	1.313	1.701	2.048	2.467	2.763
$(z)\ \infty$		.674	1.282[a]	1.645[b]	1.960	2.326[c]	2.576[d]

[a]This value has been rounded to 1.28 in the textbook.
[b]This value has been rounded to 1.65 in the textbook.
[c]This value has been rounded to 2.33 in the textbook.
[d]This value has been rounded to 2.58 in the textbook.
Source: Adapted from W. H. Beyer, *Handbook of Tables for Probability and Statistics*, 2nd ed., CRC Press, Boca Raton, Florida, 1986. Reprinted with permission.



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